Battle Command Advanced Warfighting Experiments

Summary of February and March 1994 Experiments

Monograph by

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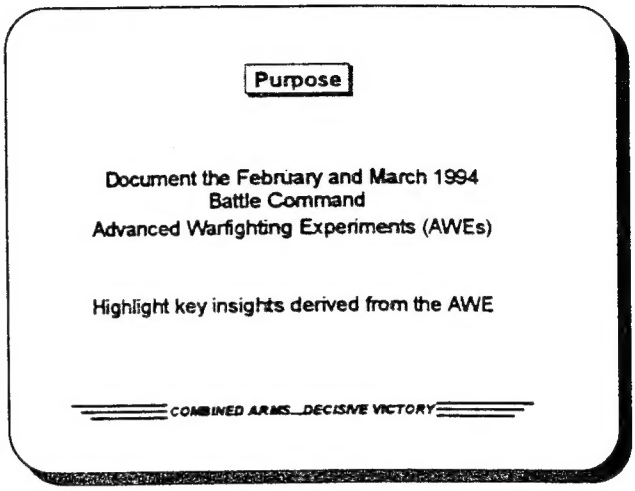
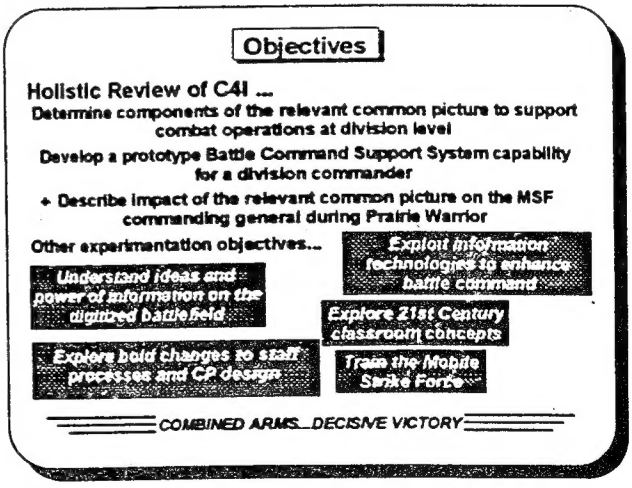
Purpose



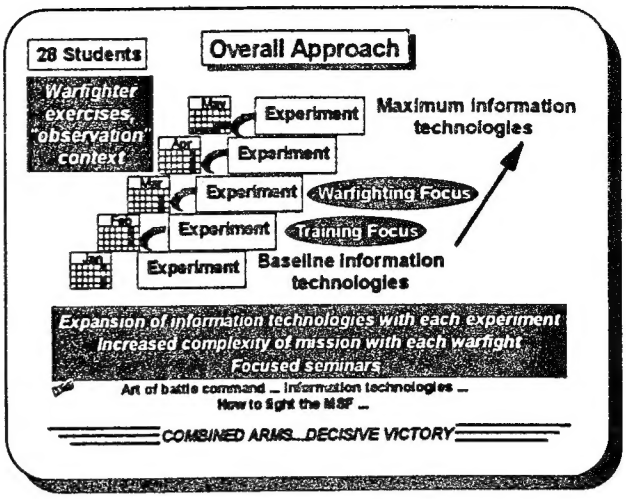
This interim report describes the activities of the February and March advanced warfighting experiments (AWEs) conducted by the Battle Command Battle Laboratory (BCBL) at Fort Leavenworth, Kansas. Additional background information is available in the first interim report, "Battle Command Advanced Warfighting Experiments - Summary of January 1994 Experiment". As mentioned in the January AWE report, these experiments are aimed at advancing the art of battle command, and are designed within the context of two activities associated with the US Army Command and General Staff College (CGSC). These activities are the Battle Command Elective (BCE), a pilot course developed jointly by BCBL and CGSC, and the Prairie Warrior student exercise conducted by the college in May 1994. In addition to a brief background on the experimentation process and some key insights from the January 1994 experiment, this report also provides emerging insights from the AWEs held in February and March 1994. The report was prepared by the Training and Doctrine Command (TRADOC) Analysis Center (TRAC) in support of BCBL.

Objectives



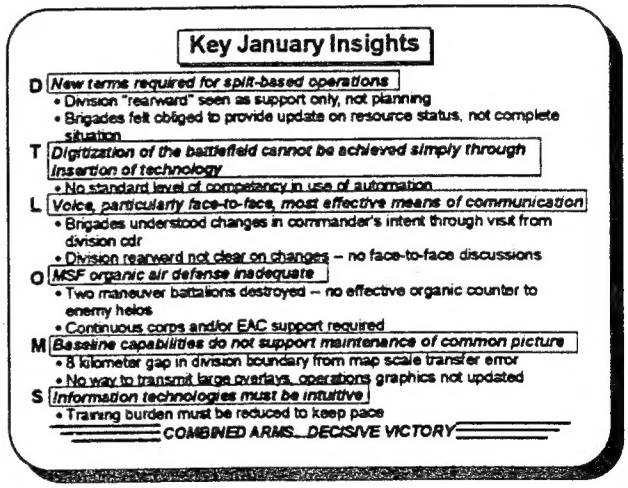
While the AWEs address several objectives, the principal focus is to support investigation of the Louisiana Maneuvers (LAM) issue assigned to BCBL, Holistic Review of Command, Control, Communications, Computers, and Intelligence (C4I). There are now three tasks for BCBL within the scope of this effort. The third task, describing the impact of the relevant common picture on the Mobile Strike Force (MSF) commanding general during Prairie Warrior, was added during the February/March 1994 experiments. The MSF is a notional future force staffed by student warfighters during the Battle Command AWEs. The Army uses the MSF as a catalyst, to spark innovative ideas and lead the Army into the 21st Century. The secondary experimentation objectives shown here are addressed as resources permit, but are not the focus of the investigation.

Overall Approach



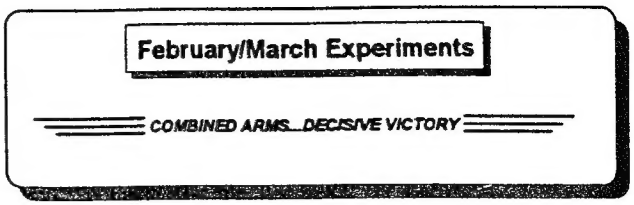
BCBL's initial concept called for five AWEs to be held from January through May 1994, one each month. A warfighting exercise was associated with each AWE to provide a set-piece for exploring the relevant common picture. Although this basic framework remained intact, some modifications to the February and March experiments were required. The warfighting exercise for February was canceled and replaced with a training plan that provided more student exposure to selected information technologies. The March experiment was expanded to include two warfighting sessions. The March exercise provided a comparison case against the January baseline experiment. This exercise setting provided a forum to obtain observations, limited to actions of the 28 student warfighters.

Key January Insights



Highlights from the January experiment reflect the fact that many new concepts were introduced to student warfighters, resulting in a wide variety of issues and insights across the TRADOC domains of doctrine, training, leader development, organization, materiel, and soldiers (DTLOMS). The newly-developed Mobile Strike Force, future combat technologies, an alternative command post configuration, a seminar-type combat simulation, and rudimentary computer technologies were all represented in the January experiment, and student warfighters may have been overloaded with so many new ideas. One message came through clearly, though: the difficulty most students demonstrated in performing relatively simple tasks on computers mandated the change in focus for February, devoting more time to hands-on training.

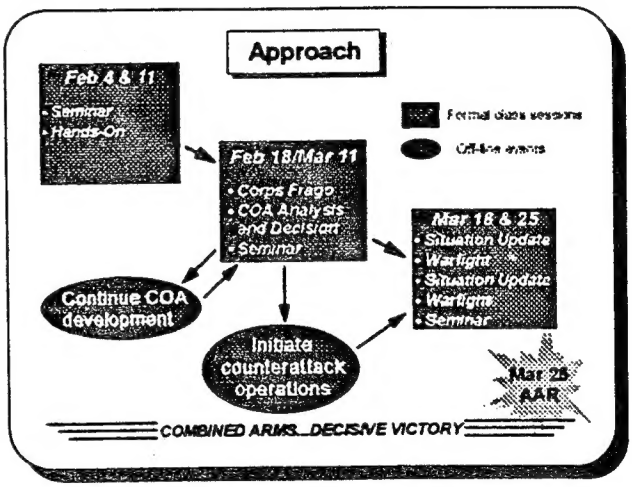
February/March Experiments



The remainder of this report specifically addresses the February and March experiments and describes the effects of additional information technologies. The BCBL project officer for the February and March experiments was MAJ Mike Schwind.

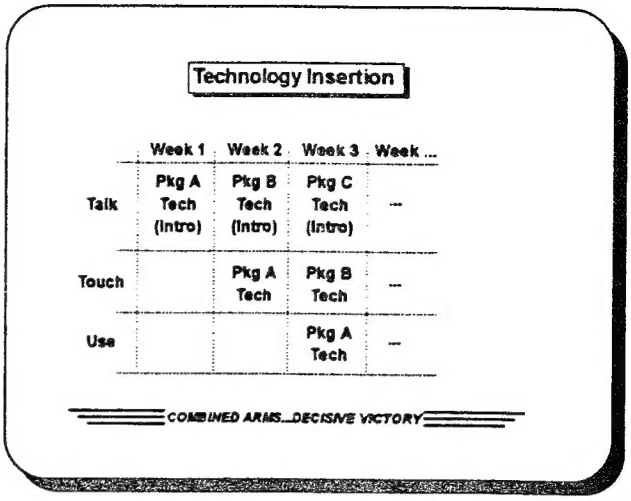
Approach for February/March Experiments

February and March experiments were restricted to 18 hours of "classroom" time per month, each in three sessions. The first class on 4 February included an after-action review (AAR) of the January experiment, conducted by LTC Ralph Burkhart, Chief, BCBL Experimentation Division. Several information technologies were introduced in a seminar after the AAR. The next session, 11 February, opened with presentations of the capabilities of various technologies by proponent agencies, contractors and private companies. Afterwards, a four-hour "hands-on" round robin was conducted to allow the students to observe and test the different technologies. The next session, 18 February, expanded the hands-on sessions. The students were issued a corps fragmentary order (FRAGO) and separated into three groups to develop and present three courses of action (COA's). One group used a traditional map/butcher paper media and two other groups used the electronic mapping capability of one of the information technologies. During the next two weeks, the MSF Commander and a small part of the staff used an automated COA evaluation tool to assess and enhance the COAs. The entire class reconvened on 11 March to conduct COA evaluation and selection, and prepare for warfighting with the development of simulation inputs. TRAC analysts used these inputs to initiate the battle and assist BCBL in developing the situation update. On 18 March the students conducted a communications exercise (COMEX), received the situation update, modified their plans, and provided inputs for the next combat cycle. The final session for the March experiment included a situation update, student modifications to plans, and final battle cycle inputs. BG(R) Wass de Czege, who served as a mentor during some of the experiments, then conducted a warfighting seminar. The experiment closed with battle results and an AAR to highlight observations and promote student feedback on the exercise. BCBL personnel served as controllers and corps staff for the warfighting exercise. As in the January experiment, observers from TRAC, Army Research Institute (ARI), and CUBIC, Inc. (formerly TITAN) were assigned to a principal Battlefield Operating System (BOS) and staff cell location, completed data collection forms on information flow and provided input to the AAR.



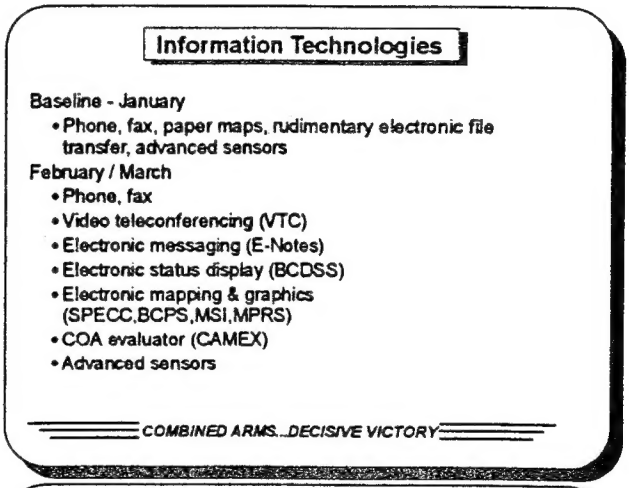
Technology Insertion

BCBL developed a plan consisting of three phases (talk-touch-use) to familiarize students with new information technologies. This approach started with a seminar ("talk") presented by government agencies, contractors, and private companies to introduce a subset of the technologies. During the next class, students were divided into small groups for a round-robin introduction to the technologies ("touch"). During the same session, another subset of technologies was introduced in a "talk" session. In a third class meeting, students would "use" the technology from the first week, "touch" the technology from the second week, and "talk" a third subset of technologies. To elicit comments from the students, a questionnaire was developed by ARI for each of the technologies. Researchers from TRAC and CUBIC also received ARI questionnaires to help determine capabilities for a prototype battle command support system (BCSS) for a division commander.



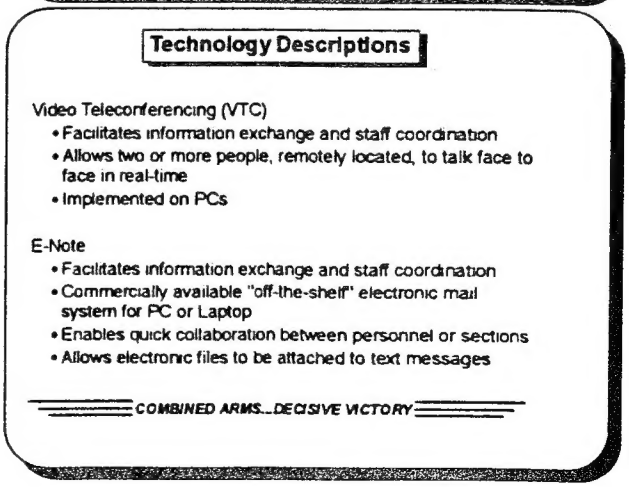
Information Technologies

The January experiment used a baseline set of information technologies. February and March experiments expanded this set to include a video teleconferencing (VTC) capability; electronic messaging; automated status reporting and display; electronic mapping and graphics (both from off-the-shelf sources and from the military research and development community); and an automated COA evaluation tool. The first four of these five capabilities align with BCBL's initial hypotheses regarding components of the BCSS. Detailed descriptions of the new technologies follow.



Technology Descriptions

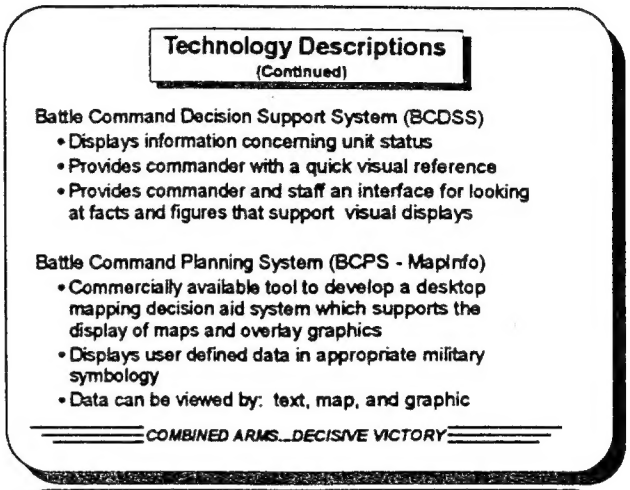
VTC capability combines image and voice in a single package and allows two or more people, remotely located, to talk "face-to-face" in real time. It represents a major step towards virtual collocation. The MSF staff used a commercially available video package to connect each unique unit, or cell, in the MSF to a simulated VTC via

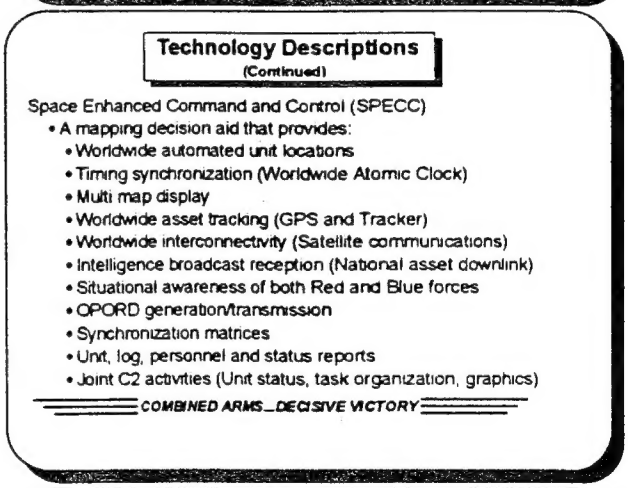


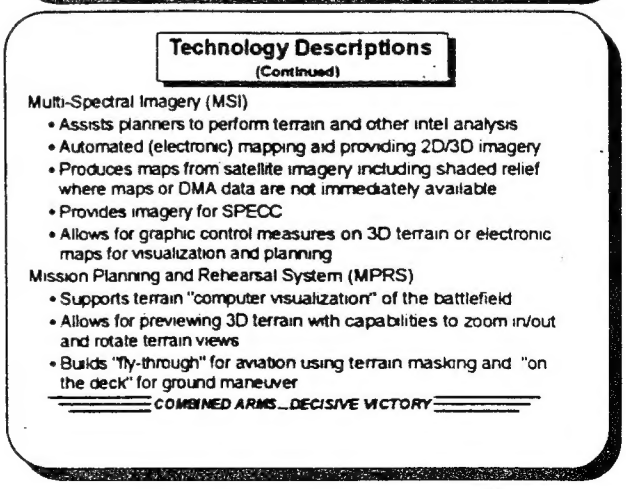
their personal computers (PCs). The capability was always available in a "push-to-talk" mode, and the students' switching requests, specifying which stations should be visible on the monitors, were handled through a central station manned by BCBL. E-Note is a commercially available, PC-based electronic mail system. Users can send messages, either point-to-point or point-to-many, over local area and wide area networks (LANs and WANs). Text messages can be appended with electronic files for quick dissemination of documents, graphics, and other products. Both VTC and E-Notes can augment voice transmission methods such as radio and telephone, and can provide an audit trail of information flow or facilitate continuous operations through judicious taping of VTC events.

The Battle Command Decision Support System (BCDSS) and the Battle Command Planning System (BCPS) are both PC-based software tools that can pass information over a LAN or WAN. BCDSS allows for the display and updating of unit status information. BCPS uses an "off-the-shelf" desktop mapping software tool (MAPINFO) as a basis for building, displaying, and transmitting graphic maps, operational overlays and unit information.

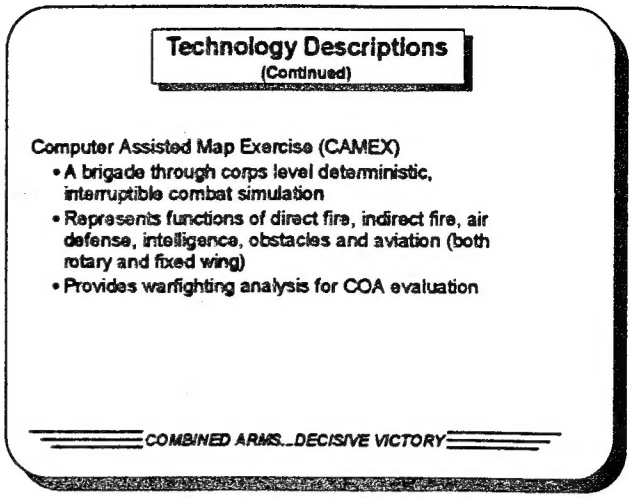
The Army Space Command (ARSPACE) presented three systems using space-based technology: Space Enhanced Command and Control (SPECC) system, Multi-Spectral Imagery (MSI), and Mission Planning Rehearsal System (MPRS). SPECC, an electronic map display system with operational graphics, uses satellite links for data transfer and communications. MSI provides digital imagery (2D, 3D, and shaded relief) as well as terrain elevation data (from various sources not limited to LANDSAT and Defense Mapping Agency (DMA) data) supporting electronic mapping systems such as SPECC. MPRS, part of an overall ARSPACE Battlefield Visualization System, is an electronic mapping system providing 3D fly-through capability and terrain previewer with the ability to rotate terrain and zoom in/out for both air and ground visualization.





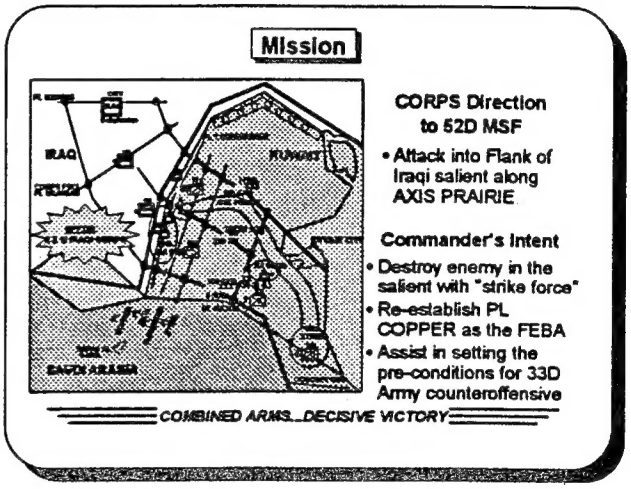


As a COA evaluation tool, the Computer Assisted Map Exercise (CAMEX) provides analytic results based upon recognized and approved combat methodology. CAMEX uses a detailed user interface to present a display of the battlefield with operational graphics to portray the situation, for both friendly and enemy, at a specific time of the battle. Unit orders are entered during execution to provide analytic results for different alternatives of the selected courses of actions.



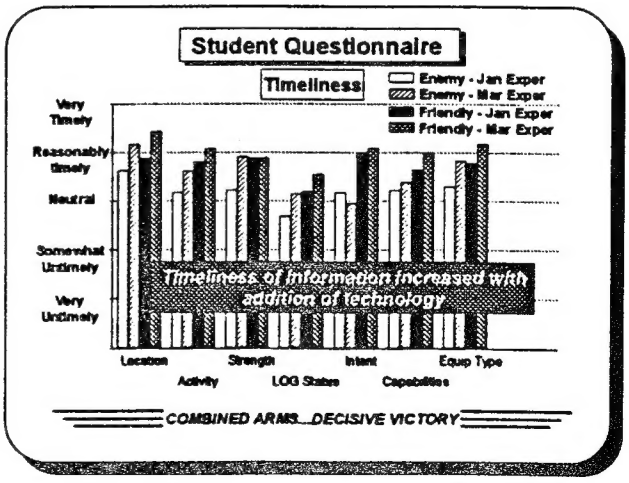
Mission

The MSF warfighting mission was to attack into the flank of the Iraqi salient, destroy the lead division, re-establish the FEBA, and assist in setting the pre-conditions for a counter-offensive by the 33rd Army. This mission was more complex than the one in January. To support the planning and execution of the mission, information technology was inserted to assist in obtaining a relevant common picture for the commander and staff. Paper maps were replaced using electronic mapping with operational graphics and terrain visualization. The telephones and faxes were augmented by VTC, electronic messaging and electronic status tools. The COA process was supported with the automated evaluator, CAMEX, as a warfighting analysis tool.

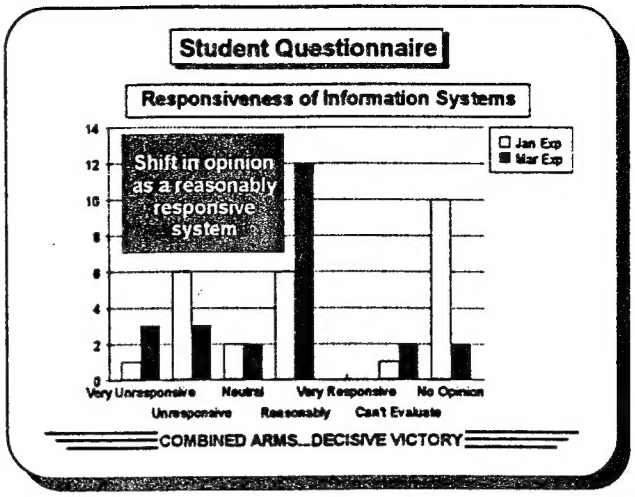


Student Questionnaire

The student assessment used the same elements of information as in the January exercise and obtained similar results, but more interesting was comparing the results between experiments. The technology inserted in March increased the students' perception that information was more timely in most cases than in January. Six categories (friendly and enemy locations, friendly activity, intent, capabilities and equipment type) were rated above "reasonably timely" while in the January exercise there were none. The largest increases occurred in friendly location and enemy strength. With respect to the enemy,

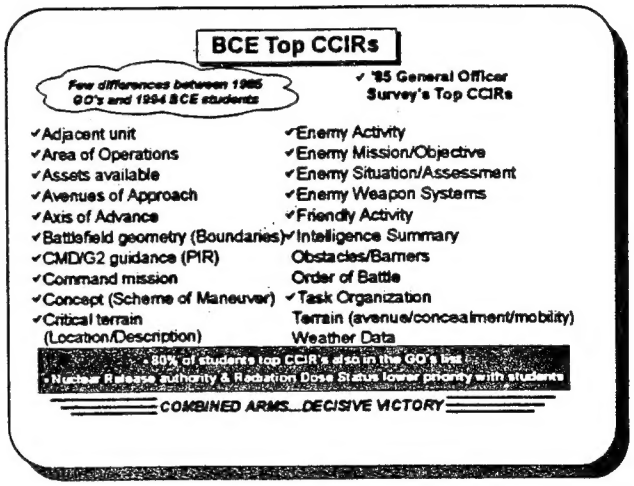


students still basically wanted to know where is he, what is he doing, and what is he going to do? Both enemy logistics information and friendly logistics status were still rated as the least critical element of information, but their timeliness increased to be considered "neutral". There was also a positive shift in the perception of the responsiveness of information systems, with half of the respondants now considering the system to be reasonably responsive. Levels of adequacy of information also increased from the manual experiment. Additional comments from the student questionnaires with respect to specific technologies and BOS have been incorporated in the AAR section.



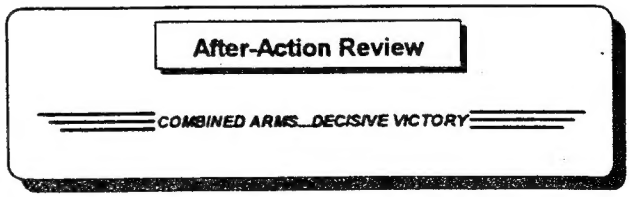
BCE Top CCIRs

The students in the BCE also ranked 83 potential information elements of a set of Commander's Critical Information Requirements (CCIR). This ranking was compared to a ranking of similar elements by a group of division and corps commanders in 1985. There was no statistical difference between the ranking of the CCIR by the BCE students and the general officers. However, the relative ranking of two elements relating to nuclear operations reflects the shift away from tactical nuclear operations over this period. Out of the list of 83 elements these two elements were within the top 25 elements in 1985, but were ranked within the bottom 25 elements in 1994.

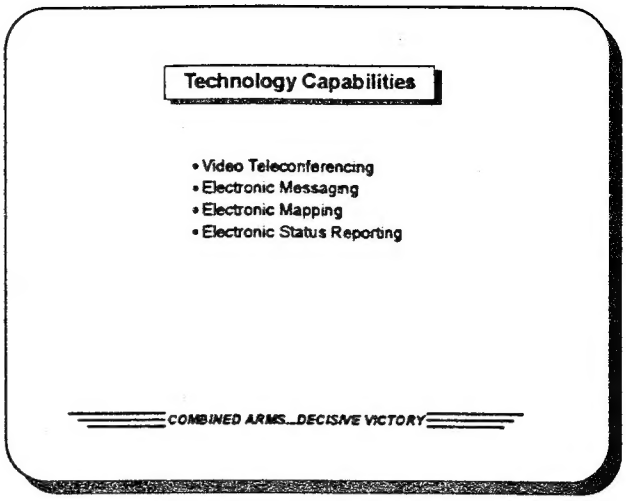


AAR

The AAR again provided insights to stimulate discussion among the student participants but focused on the impact that the new technology had on the exercise. A summary of insights was prepared for the new information technology areas as well as for each BOS. Insights were initially developed from observer input; student contributions to the process have been incorporated at the bottom of each technology or BOS slide.

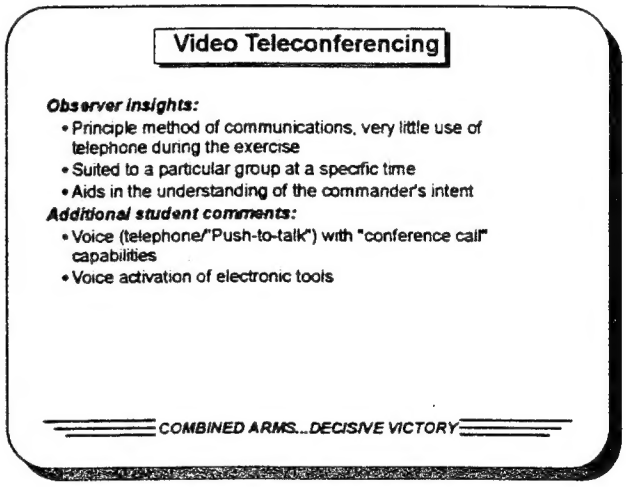


Technology Capabilities



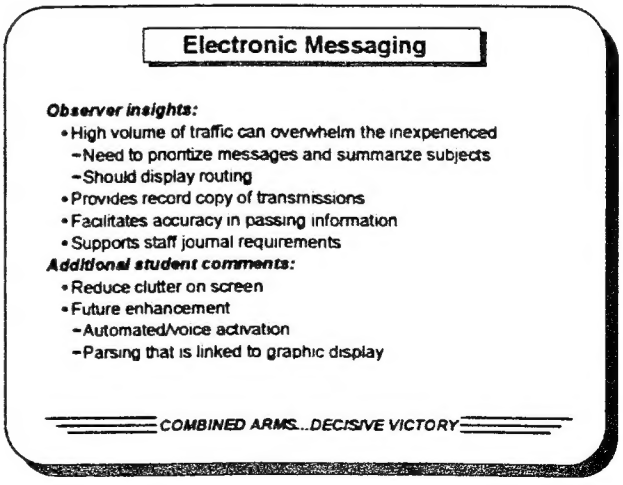
Technology capabilities align with these four components of the BCSS: Video teleconferencing (VTC), electronic messaging, electronic mapping, and electronic status reporting. These capabilities either augment existing technologies, automate existing processes, or enhance the effects of current capabilities with "state-of-the-art" technology. Reworking of unit Standard Operating Procedures (SOPs) is necessary to ensure appropriate use of the technologies. Effects of these technologies are enhanced because of their ability to be implemented in a PC, "off-the-shelf", environment at many individual locations through networking. The BCSS must include a robust interfacing of all components and technologies to allow for sharing and transmitting of information.

Video Teleconferencing



During the March experiment VTC replaced the telephone as the most commonly used method of communication. Students commented that VTC might be better suited to a particular group, but observations showed it was used heavily by the commanders (division and brigades) and operations personnel. VTC also provided a better understanding of the commander's intent, combining both audio and visual capabilities. The students creatively used this technology by adjusting the camera to focus on an electronic map while continuing their verbal discussion. VTC should be considered not as a replacement for standard communication tools, but as a complement to them.

Electronic Messaging

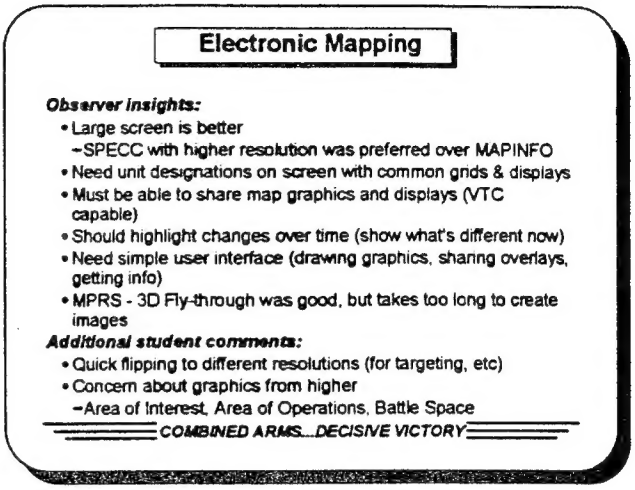


This capability allows for quick transmission and hard copy historical recording of information. E-mail augmented the VTC and essentially replaced the fax that was used the January exercise. Using "off-the-shelf" software and hardware, electronic messaging provides highly responsive reaction time. During the experiment this "real-time" capability had a tendency to overwhelm the inexperienced user

since it was used in conjunction with other software on the same PC workstation, and tended to interrupt other work. The commercial, off-the-shelf software that was selected, E-Note, provided the students with an exposure to an electronic mailing capability that is commonly found on PC's but lacked some capabilities necessary for a command post environment. Several enhancement suggestions were proposed by observers and students, as shown.

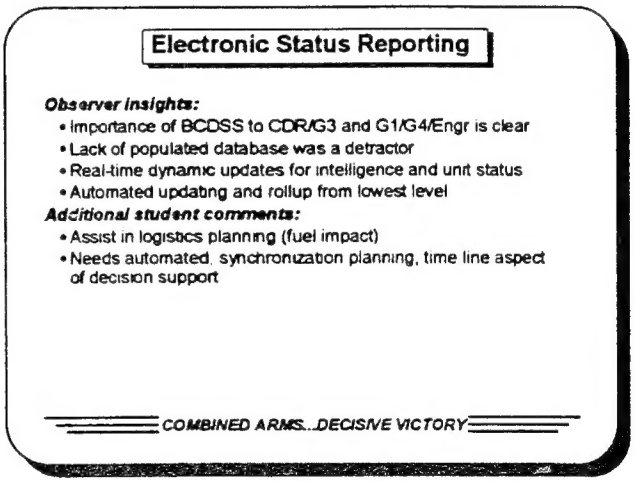
Electronic Mapping

With an imposed restriction of "no paper maps" students were forced to do their staff planning and analysis with the electronic mapping tools, most of which were still under development. Although students were frustrated using prototype mapping tools, they were able to identify improvements to make the software more functional and user friendly, such as multiple resolutions maps for different tasks, common graphic symbols, and sharing graphic overlays. Both SPECC and BCPS are incomplete by themselves and have overlapping capabilities.

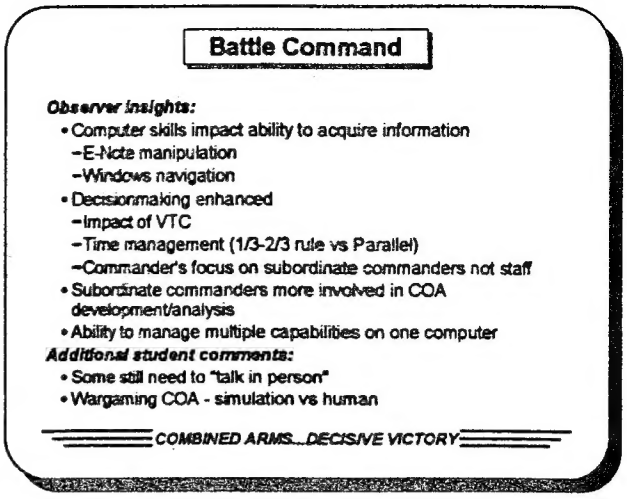


Electronic Status Reporting

Limited use of the status reporting system, BCDSS, was a result of the limited initial population of the data base and a requirement on the students to manually update the data base after each warfighting cycle. Even with this limited use, the importance for an automated status reporting system was apparent. Status reporting was not simpler in March, but the lack of an automated link between the other technologies was a major detractor during the experiment.

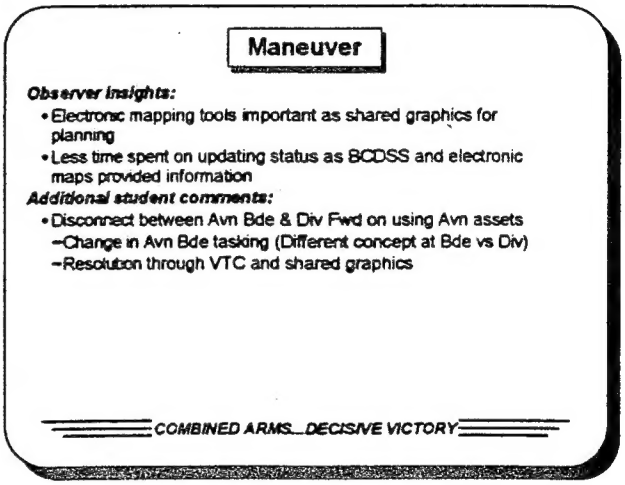


Battle Command



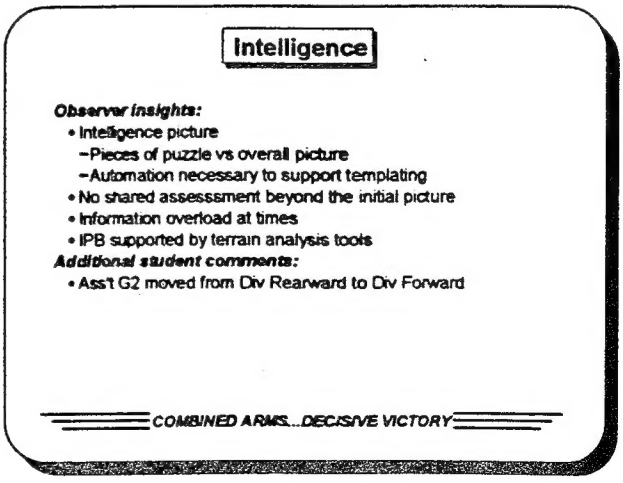
Even though face-to-face discussions with the MSF Commander were extremely useful in clarifying issues during the first experiment, no such discussions were held during the March exercise. Some students still felt that there is a need to talk face-to-face with a person rather than through a machine. Battle command was facilitated using available technology, especially the VTC. Generally accepted time management guidelines in planning (one-third of total available planning time for parent echelon, two-thirds for subordinates) are being challenged because of the capabilities of the new technology. The role of the subordinate commanders in the decisionmaking process was expanded as a result of a near "real-time", interactive communications capability with the division commander and staff.

Maneuver



Use of electronic mapping tools with shared graphic overlays facilitated maneuver operations and clarified many issues in the warfight. During the exercise a different concept existed between the aviation brigade and division forward CP with respect to the use of aviation assets in support of 2nd brigade operations. The problem was corrected through sharing graphic overlays and VTC communications. Inconsistencies in a "common picture" from using two different mapping tools caused needless rechecking of information.

Intelligence

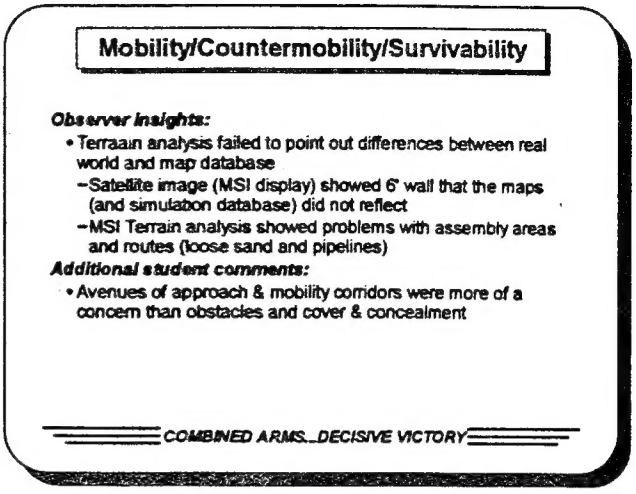


Only two MI officers were on the staff - one in division forward and the other in division rearward. Further, there was a lack of an ASAS-like intelligence processor. Thus, an information overload occurred several times during the exercise, prompting the Commander to move the Assistant G2 to the forward CP to support the G2 in processing and disseminating intelligence. Intelligence processes were enhanced by the use of MSI for terrain analysis and the 3D visualization capability of MPRS.

Although the responsiveness of the systems was adequate during the planning phase, these systems require specially trained operators and substantial preparation to support battle execution.

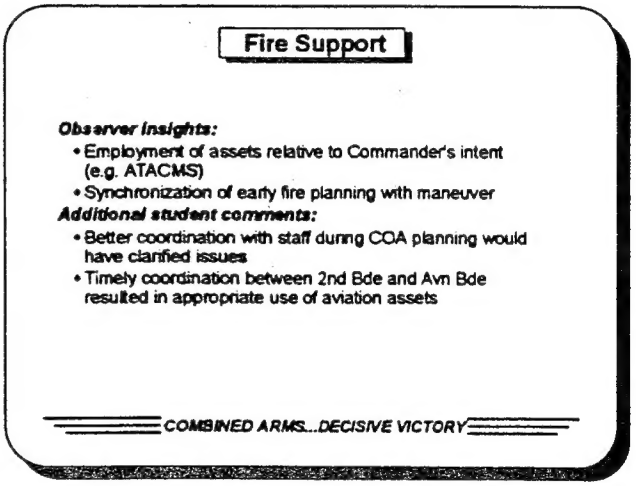
Mobility/Countermobility/Survivability

Differences between the real world and the digital map database used by the simulation made an impact in the warfight. A 6' wall observed on the MSI display was not highlighted in the staff briefing and therefore not reported in the terrain analysis to the division. This points out that users of these systems need to gain familiarity and a degree of confidence with respect to the information these new technologies provide. Imagery obtained by satellites can be much more current than the more familiar paper maps.



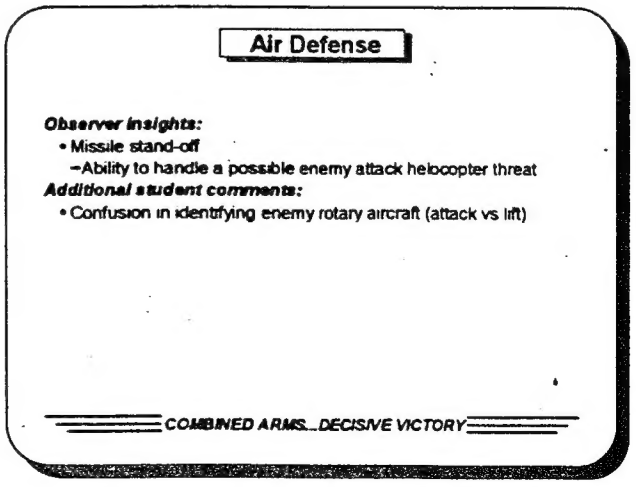
Fire Support

During the COA evaluation only selected staff members, not including artillery experts, participated in reviewing CAMEX results for COA analysis. This led to a lack of confidence that appropriate consideration of artillery assets had been made, and resulted in heated discussions prior to the division commander's decision. Better coordination with key staff members would have avoided the situation. A more detailed presentation of the COA evaluation process and results would also have helped. Improved communications during the warfight using VTC and electronic maps resulted in timely coordination between 2nd Bde and Aviation Bde to improve the use of aviation assets.



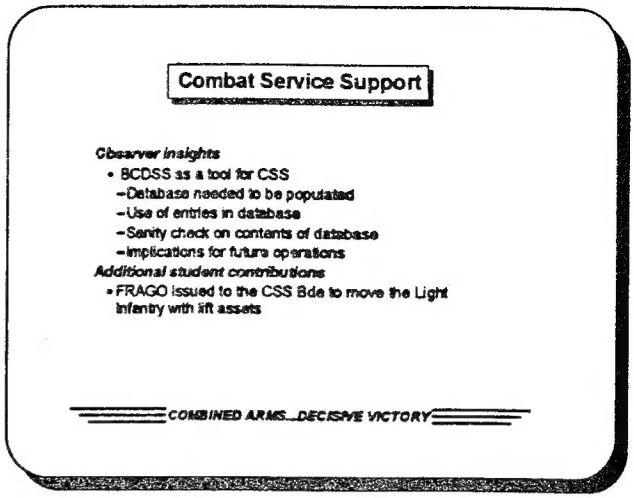
Air Defense

As in January, the MSF again experienced problems in identifying an enemy helicopter attack. This time adequate warning of the incoming aircraft was communicated using VTC and electronic messaging, but there was confusion as to the type of incoming aircraft (attack or lift). The range of the organic air defense assets was still inadequate to provide protection to a possible threat air attack.



Combat Service Support

Controller-initiated events using electronic messages were introduced to increase CSS activity. These events put a demand on the CSS Bde that identified the need for a fully populated database to support a decision support system like BCDSS. A FRAGO, issued by the Division Commander, directed the CSS Bde conduct operations using lift assets to move the Light Infantry as a security force in support of 2nd Bde's operations plan. These actions increased CSS activity over the January exercise, but improvements are still needed to enhance realism.



Summary of Key Insights

Highlights of the March insights across the DTLOMS indicate that the insertion of technology presents new challenges to the commander and staff. Information will be needed at a faster rate and will be limited by how quickly the information can be processed by the soldier working with it. Inserted technology must be a totally integrated package in a seamless architecture. The increased level of confidence between January and March reinforced the importance of training and experience on a battlefield proliferated with high technology.